

An Amendment to EXPRESS
supporting STEP Modularization

An Update Since Lillehammer
August 1999

WG10 STEP Modularization PWI

Contact - David Price

dmprice@us.ibm.com

+1 843 760 4341

Agenda

- **Modularization and Amendment Requirements**
- **Technical Solutions**
- **The Standardization Plan**

Modularization and Amendment **Requirements**

Requirements

- **These requirements come from two sources**
 - **the WG10 STEP Modularization PWI**
 - **the nominated projects using the modular approach**
- **“Fundamental” high level requirements**
 - **These are the technical requirements on EXPRESS to support modularization itself**
- **“Amendment” high level requirements**
 - **These are the requirements on EXPRESS resulting from the fact that we are amending EXPRESS**

Requirements

- **Fundamental requirements**
 - upward compatibility
 - limit the impact on existing implementations
 - extensibility of constructed data types
 - separation of supertype constraint from entity
 - rename of attributes
- **Amendment requirements**
 - schema version identification
 - **EXPRESS** language version identification

Upward compatibility

- **Any EXPRESS TC2 conforming schema shall remain valid under the amendment**
- **No changes identified to any existing SC4 schema shall be required as a result of the amendment**
- **Enhancements included in the amendment shall be compatible with EXPRESS edition 2**
- **These are requirements on the amendment itself**
 - **STEP Modularization is an “incremental improvement” therefore the upward compatibility of existing EXPRESS schemas is a requirement**

Limit the impact on existing EXPRESS implementations

- **The scope of the amendment shall be as limited as is possible while meeting the modularization requirements**
- **No enhancement shall be included in the amendment that requires changes to Part 21 syntax**
- **Limit the impact on EXPRESS parsers as much as possible**
 - **However, there will be impact on parsers**

Extensibility of constructed data types

- **Modularization requires the ability to declare constructed data types that may be extended**
- **Modularization requires the ability to declare an extensible constructed data type that declares no items**
 - **e.g. empty extensible select type**

Separation of supertype constraint from entity

- **Modularization requires the ability to declare a supertype constraint outside the declaration of an entity**

Rename of attribute

- **Modularization requires the ability to rename an entity attribute as well as the existing ability to rename entities**

Schema version identification

- **Amending EXPRESS requires the ability to identify the version of a schema**
 - **Note that this also supports a requirement to configuration manage the numerous schemas that may result from modularization**

EXPRESS language version **identification**

- **Amending EXPRESS requires the ability to identify the version of the EXPRESS language to which the schema conforms**

Technical Solutions

Technical Solution - Use EXPRESS 2

- **Adopt EXPRESS edition 2 solutions with limitations**
 - the amendment shall include only E2 solutions for which modularization has identified immediate requirements
 - the amendment shall not include E2 solutions that cause existing schemas to become invalid
- **The syntax provided in this presentation is drawn from a working draft of the amendment and therefore provisional**

Technical Solution - Constructed Types

- **Extensibility of constructed data types**

- **SELECT**

```
284 select_type = [ EXTENSIBLE ] [ GENERIC_ENTITY ]  
    SELECT [ ( select_list | select_extension ) ] .  
410 select_list = '(' named_type { ',' named_type }  
    ')' .  
409 select_extension = BASED_ON type_ref [ WITH  
    select_list ] .
```

- **ENUMERATION**

```
201 enumeration_type = [ EXTENSIBLE ] ENUMERATION [ (  
    OF enumeration_items ) | enumeration_extension ] .  
402 enumeration_items = '(' enumeration_id { ','  
    enumeration_id } ')' .  
403 enumeration_extension = BASED_ON type_ref [ WITH  
    enumeration_list ] .
```

Technical Solution - Supertype constraint

- **Separation of supertype constraint from entity**
 - **Continue to allow existing SUPERTYPE constraint**
 - **Add E2 SUBYPE_CONSTRAINT which includes**
 - **The existing SUPERTYPE constraint constructs**
 - **TOTAL_OVER**
 - **ABSTRACT ENTITY**
 - **And the associated GENERIC data types**
 - **Note that E2 connotational subtype is not included as there is no requirement from modularization**

Technical Solution - The new subtype syntax

```
412 subtype_constraint_decl = subtype_constraint_head
    subtype_constraint_body END_SUBTYPE_CONSTRAINT ';' .
413 subtype_constraint_head = SUBTYPE_CONSTRAINT
    subtype_constraint_id FOR entity_ref ';' .
411 subtype_constraint_body = [ abstract_supertype ] [
    total_over ] [ supertype_expression ';' ] .

400 abstract_supertype = ABSTRACT SUPERTYPE ';' .
415 total_over = TOTAL_OVER '(' entity_ref { ',' entity_ref }
    ')' ';' .

298 supertype_expression = subtype_factor { ANDOR
    subtype_factor } .
299 supertype_factor = supertype_term { AND supertype_term } .
301 supertype_term = entity_ref | one_of | '('
    supertype_expression ')' .
250 one_of = ONEOF '(' supertype_expression { ','
    supertype_expression } ')' .
```

Technical Solution - Rename an attribute

- **Use ability to rename redeclared attributes**

```
167 attribute_decl = attribute_id |  
    redeclared_attribute  
406 redeclared_attribute = qualified_attribute  
    [ RENAMED attribute_id ] .  
354 qualified_attribute = SELF group_qualifier  
    attribute_qualifier .  
295 group_qualifier = '\\' entity_ref .  
218 attribute_qualifier = '.' attribute_ref .
```

Technical Solution - Schema version identification

- **Schema version identification**

```
281 schema_decl = SCHEMA schema_id [  
    schema_version_id ] ';' schema_body END_SCHEMA ';' .  
407 schema_version_id = string_literal .  
313 use_clause = USE FROM schema_ref [  
    schema_version_ref ] [ '(' named_type_or_rename {  
    ',' named_type_or_rename } ')' ] ';' .  
408 schema_version_ref = string_literal .  
267 reference_clause = REFERENCE FROM schema_ref [  
    schema_version_ref ] [ '(' resource_or_rename {  
    ',' resource_or_rename } ')' ] ';' .
```

Technical Solution - Language version identification

- **EXPRESS language version identification**

```
405 language_version_id = '{ iso standard  
10303 part (11) version (4) }' .
```

```
302 syntax = [ language_version_id  
]schema_decl { schema_decl } .
```

The Standardization Plan

Project management

- **Coordinate this project under EXPRESS 2**
- **Propose a New Work Item as soon as possible**
 - **expect placement in WG11**
 - **Project leader is same as the EXPRESS edition 2 project leader - Phil Spiby**
 - **Editors representing modularization and EXPRESS expertise - David Price and John Valois**
 - **Amendment is a stepping stone towards EXPRESS edition 2 supporting STEP modularization requirements - it DOES NOT remove need for E2!**

Standardization(1)

- **Precede the EXPRESS edition 2 ballot**
- **According to ISO rules**
 - **no NWI, the amendment falls under the E2 NWI**
 - **cannot amend an IS with a TS, options are:**
 - **may be standardized as a “Minor Technical Amendment” which can go to directly into FDIS ballot with WG/SC4 approval**
 - **standardized as a “Minor Technical Revision” which is an entire new document is also possible**
 - **standardize as TS under an ISO number other than ISO 10303**
 - **normal CD-DIS-FDIS-IS ballot cycle**
 - **others?**

Standardization(2)

- **The project team recommends**
 - **1999-08 Circulate presentation/summary information to SC4**
 - **1999-09 Circulate the complete amendment with New Orleans SC4 resolution packet**
 - **1999-11 “Ballot” workshop at New Orleans ISO**
 - **1999-11 Proposed resolution for New Orleans SC4 meeting allowing “Minor Technical Amendment” going to FDIS ballot**
 - **This assumes all issues successfully addressed at New Orleans “ballot” resolution workshop, SC4 approval and appropriate QC review after New Orleans**
 - **2000-02 If FDIS fails, repeat the process**

Standardization(3)

- **Originally, the team recommended:**
 - **Assuming approval, publish the Technical Specification as a single document subsuming TC1, TC2 and the Amendment**
 - **Based on the Minor Technical Amendment process, combining the TCs and Amendment into one document is not possible**